

WHAT IS CLAIMED IS:

1 24. A method of providing lubricity in a forming or machining fluid,
2 comprising the steps of:

3 providing a forming or machining fluid;

4 providing a boron compound; and

5 dissolving the boron compound in a carrier at a concentration of from
6 about 2% to about 24% in the forming or machining fluid.

1 25. The method of claim 24 wherein the carrier is selected from the
2 group consisting of water, hot water, n-alcohol, a combination of solvents, polyhydric
3 alcohol, PAGs besides polyhydric alcohol, mineral oil, synthetic base oil, greases,
4 vegetable based oil and combinations thereof.

1 26. The method of claim 24 wherein the boron compound is a
2 compound including at least one of boric acid molecules, BO_3 ions, and BO_3 monomers to
3 the carrier fluid.

1 27. The method of claim 24 wherein the boron compound is in the
2 form of a nanometer-sized particulate.

1 28. The method of claim 24 wherein the boron compound is boric acid.

1 29. The method of claim 26 wherein the boron compound is selected
2 from the group consisting of borax, boric oxide, hydrated forms of boron, boron
3 anhydrides and combinations thereof.

1 30. The method of claim 24, further comprising the step of dissolving
2 the boron compound in a solvent before being added to the carrier.

1 31. The method of claim 30, wherein the solvent is selected from the
2 group consisting of methanol, ethanol, isobutyl alcohol, pyridine, isoamyl alcohol, n-

3 propanol alcohol, alcohol, 2-methylbutanol, glycerol, glycol, lactate esters and
4 combinations thereof.

1 32. The method of claim 25 wherein hot water is used as the carrier for
2 spraying, roll-coating or dipping a metal substrate in a solution of boric acid for the
3 purpose of metal forming.

1 33. The method of claim 32 wherein hot water and a boron compound
2 are introduced simultaneously within an applicator for the purpose of metering varying
3 amounts or concentrations of solution onto a substrate via a spray application.

1 34. The method of claim 25 wherein methanol is used as the carrier for
2 spraying, roll-coating or dipping a metal substrate in a solution of boric acid for the
3 purpose of metal forming.

1 35. The method of claim 25 wherein glycol, glycerol, or a
2 polyalkylene glycol is used as a carrier for the purpose of providing cooling and
3 lubrication in a machining operation of a metal or alloy.

1 36. The method of claim 32, wherein a dry film is formed, and wherein
2 the resulting dry film provides improved cooling and lubrication in metal parts stamping
3 operations.

1 37. The method of claim 32, wherein a dry film is formed, and wherein
2 the resulting dry film is easily removed with a cold water rinse after the metal forming
3 operation.

1 38. The method of claim 32, wherein a dry film is formed, and wherein
2 the resulting dry film allows more radical angles and forms to be achieved than are
3 otherwise possible.

1 39. The method of claim 32, wherein a dry film is formed, and wherein
2 the resulting dry film lubricity reduces metal transfer from a work-piece to a die,
3 extending the life of the die.

1 40. The method of claim 35 wherein the machining fluid imparts
2 extended tool life by virtue of reduced heat and friction at the tool/work-piece interface.

1 41. The method of claim 35 wherein the machining fluid imparts better
2 surface finishes with less oxidation and atomization of the fluid than is typically
3 experienced.

1 42. The method of claim 35 wherein the machining fluid is by nature,
2 stable and odor-free, generating parts that require little or no post operation treatment or
3 cleaning.

1 43. The method of claim 31 wherein the solvent is utilized to introduce
2 nanometer sized particulate into a fluid selected from the group consisting of water, hot
3 water, n-alcohol, a combination of solvents, polyhydric alcohol, PAGs besides polyhydric
4 alcohol, mineral oil, synthetic base oil, vegetable based oil and combinations thereof, in
5 order to enhance the cooling and lubricating properties of the respective fluids.

1 44. The method of claim 24, wherein the forming or machining fluid
2 includes drilling muds.

1 45. A method of applying a boron compound in a powder form or a
2 liquid form directly onto a substrate using electro-static methods to achieve a higher
3 degree of lubricity on the surface of the substrate.

1 46. The method of claim 25, wherein water is used as the carrier to
2 create a suspension of boric acid.